

**Philadelphia Phase II Ozone SIP
Supplemental Information
Inclusion of 110 SIP Call Modeling
August 1998**

Incorporation of the EPA's 110 SIP Call Modeling into the Philadelphia Nonattainment Area's Phase II Submittal

Enclosed please find supplemental information to be included as part of Pennsylvania's Phase II Attainment Plan for the Philadelphia metro area. This information provides additional weight of evidence supporting Pennsylvania's position that the Philadelphia area will reach attainment of the current one-hour ozone standard by 2005 as required by the Clean Air Act (CAA).

The supplemental information incorporates modeling designed to gauge the affect of regional NOx controls outlined in EPA's 110 SIP call. Details of this modeling study are found in an EPA document dated May 8, 1998¹. Results from EPA's 110 SIP Call simulations were used to estimate the amount of ozone reductions achieved after regional NOx controls are in place. The ozone reduction estimate was determined by examining model data from three episodes (1991, 1993 and 1995) and then constructing county-specific reduction factors. A complete description of this procedure is included in Attachment 1. Reduction factors were then applied to county specific design values* for the 1994-96 time period. The resulting ozone concentrations were then compared to the current one-hour ozone standard (125ppb) to determine the likelihood of the county reaching attainment after the 110 SIP call is in place. Results from this exercise are described in a memo from Bill Hunt (Attachment 2) and summarized in Table 1 below for the counties making up the Philadelphia nonattainment area (see Map 1 in the Philadelphia Phase II document). Information listed in Table 1 came from a summary document included as Attachment 3.

Table 1.

State	County	1994-96 Design Value	Rollback Design Value
PA	Philadelphia	130	116
PA	Delaware	124	106
PA	Bucks	137	117
PA	Montgomery	118	98
MD	Cecil	139	115
DE	Kent	115	95
DE	New Castle	134	110
NJ	Camden	127	109
NJ	Cumberland	105	86
NJ	Gloucester	125	108
NJ	Mercer	134	113

* The design value is defined as the fourth highest one-hour ozone concentration over a three-year period.

Results from Table 1 indicate substantial reductions in ozone concentrations once the 110 SIP Call is in place. Further ozone reductions will likely occur due to local emission reductions described in Pennsylvania's Phase II document, but not applied in the 110 SIP Call modeling. This information combined with results from Pennsylvania's trend analysis described in our Philadelphia Phase II document provides a weight of evidence indicating Philadelphia will reach attainment by 2005.

¹ Federal Register/Vol. 63, No. 90/Monday May 11, 1998/Proposed Rules

Web Document: http://www.access.gpo.gov/su_docs/aces/aces140.html ,
search federal register "SNPR"

ATTACHMENT 1.

Description of EPA's Rollback Method

Procedures for Estimating the Impact of Regional Strategies on County-Specific Ozone Design Values

The following procedures were used to estimate the effects of regional strategies on 1-hr county-specific ozone design values.

Step 1: Calculate Ambient Design Values

- (a) For each monitor in a county determine the monitor specific 1-hr design values by taking the 4th highest daily maximum value from ozone data collected at the monitoring site for the period 1994-1996.
- (b) Select the highest design value from all monitors within the county as the county-specific design value.

Step 2: Generate Model Predictions for three OTAG Episodes (July 1991, 1993 and 1995) for the following two scenarios

- (a) Base Year model predictions reflecting emissions levels in the 1994-1996 time period.
- (b) Regional Strategy model predictions reflecting a future year strategy scenario (e.g., state-specific budgets in the NO_x SIP call).

Step 3: Calculate an Adjustment Factor for each Grid Cell

Notes:

- (1) The adjustment factor is based on the percent difference in ozone predictions between the Base Year and the Regional Strategy. These factors will be used in Step 5 to "rollback" ambient design values to reflect the impacts of the regional strategy.
- (2) Step 3 must be followed separately for the Base Year scenario and the Regional Strategy.

For each grid cell:

- (a) Calculate daily maximum ozone concentrations for every day simulated (excluding 1st two-three days of each episode) for the three OTAG episodes identified in Step 2.
- (b) For each episode select the 1st, 2nd, and 3rd highest daily maximum values

- (c) For each of these "ranks" (i.e., 1st, 2nd, and 3rd ranked values), average the concentrations across the episodes (e.g., sum all 1st ranked values and divide by number of episodes). This yields an average value for each rank (i.e., average of the highest concentrations, average of 2nd highest, and average of the 3rd highest values).
- (d) For each of the average ranks, calculate the percent difference in ozone between the Base Year scenario and the Regional Strategy. As an example of the equation for the highest ranked value:

$$PD_1 = [(avgR_1 - avgB_1) / avgB_1] * 100$$

Where: PD_1 is the percent difference for highest value
 $avgR_1$ is the average of highest value for Regional Strategy
 $avgB_1$ is the average of highest value for Base Year

This yields a percent difference in each grid for the highest, a percent difference for the 2nd highest, and a percent difference for the 3rd highest values.

- (e) Calculate the mean of the percent differences (i.e., sum the percent difference calculated for the 1st, 2nd, and 3rd highest values and divide by 3)

$$ADJ_g = (PD_1 + PD_2 + PD_3) / 3$$

Where: ADJ_g is the adjustment factor for the grid cell

Step 4: Assign Grid Cell Adjustment Factors to Individual Counties

- (a) A grid cell's adjustment factor is assigned to a county based on the relative portion of the grid cell area covering the county. The grid with the largest fraction of area in a county is assigned to that county.
- (b) For counties that completely contain more than one grid cell, the grid cell with the highest Base Year predicted concentration is assigned to that county.
- (c) The step of assigning a unique grid cell to each county yields the county-specific adjustment factor. Note that only one grid cell is assigned to a county. Thus, there is no spatial averaging or spatial weighting of adjustment factors using multiple grid cells in determining the county-specific factors.

Step 5: Rollback Ambient Design Value

Note:

This step adjusts the ambient design values in each county to reflect the ozone reductions estimated to result from the Regional Strategy.

- (a) Multiply the county-specific ambient design value, from Step 1, times the county-specific adjustment factor from Step 4, using the following equation:

:

$$DV_R = DV_A \times (1 + ADJ_c / 100)]$$

Where, DV_R is the design value after adjustment for the Regional Strategy,

DV_A is the ambient design value, and

ADJ_c is the adjustment factor for the county

Note: Estimates of which counties come into attainment are calculated based on a "roll-back" of county-specific Design Values. The Design Values are derived from three years of ambient measurements. The "roll-back" factors are based on the reduction in ozone (base year versus control strategy) predicted by a regional scale model during 3 ozone episodes. This information is useful for comparing the relative air quality improvements of alternative control options and for supplementing other analyses. The results may not be sufficient for an urban-scale attainment demonstration in all situations; therefore, States may choose to do additional modeling/analysis.

ATTACHMENT 2.

Bill Hunt Memo

INTEROFFICE MEMORANDUM

Date: 10-Jul-1998 04:21pm EST
From: BILL HUNT
RTPMAINHUB.HUNT-BILL@r3mime.r
Dept:
Tel No:

TO: See Below

Subject: NOX SIP Call for Regional Modeling to Supplement 1-Hour SIP's

**** High Priority ****

I am providing the Regional Air Directors for Regions 1 through 7 and their staff with information needed to complete the 1-hour SIP's. EPA has agreed that the NOX SIP call regional modeling may be used as part of the weight of evidence information to support the States selection of emissions reduction targets in the attainment demonstration. The purpose of this transmittal is to provide you and your staff with information on how to access and use these data. The website location from which the NOX SIP call data both emissions and model outputs may be downloaded through file transfer protocol (FTP) access is <ftp://www.epa.gov/pub/scram001/modelingcenter/>. Two files with additional information are attached to this message. The file, rollback.wpd, in WordPerfect 6.1 format, contains a description of the methodology used to interpret the impact of the modeled strategy on county-specific ambient design values. The file, 1-hour.wk4, in Lotus1-2-3 Release 5 spreadsheet format, is a listing of the 1-hour ambient county design values (1994-1996) within the regional modeling domain along with the projected change in these design values when the NOX SIP call control measures are applied.

Please share this information with your States. Feel free to call or e-mail Ellen Baldridge, if you have any questions or concerns about accessing the data and using it to supplement the States current analyses.

ATTACHMENT 3.

Results from Rollback Exercise

**1994 - 1996 1-Hr Ambient Design Values and
Adjusted" Design Values Based on SNPR Budget Modeling**

FIPs State	Cnty	Ambient 1994-96	SNPR Budget Run
1	27 Alabama	Clay	116
1	33 Alabama	Colbert	102
1	49 Alabama	De Kalb	108
1	51 Alabama	Elmore	102
1	61 Alabama	Geneva	81
1	73 Alabama	Jefferson	132
1	79 Alabama	Lawrence	96
1	89 Alabama	Madison	102
1	97 Alabama	Mobile	105
1	101 Alabama	Montgomery	94
1	103 Alabama	Morgan	114
1	117 Alabama	Shelby	127
1	119 Alabama	Sumter	85
5	19 Arkansas	Clark	92
5	35 Arkansas	Crittenden	121
5	97 Arkansas	Montgomery	80
5	101 Arkansas	Newton	80
5	119 Arkansas	Pulaski	105
9	1 Connecticut	Fairfield	144
9	3 Connecticut	Hartford	141
9	5 Connecticut	Litchfield	119
9	7 Connecticut	Middlesex	140
9	9 Connecticut	New Haven	149
9	11 Connecticut	New London	132
9	13 Connecticut	Tolland	120
9	15 Connecticut	Windham	137
10	1 Delaware	Kent	115
10	3 Delaware	New Castle	134
10	5 Delaware	Sussex	109
11	1 D.C.	Washington	125
12	9 Florida	Brevard	86
12	11 Florida	Broward	103
12	13 Florida	Calhoun	86
12	31 Florida	Duval	111
12	33 Florida	Escambia	117
12	57 Florida	Hillsborough	109
12	71 Florida	Lee	89
12	73 Florida	Leon	90

12	81 Florida	Manatee	94	96
12	95 Florida	Orange	104	106
12	97 Florida	Osceola	96	98
12	99 Florida	Palm Beach	89	88
12	101 Florida	Pasco	87	89
12	103 Florida	Pinellas	92	94
12	105 Florida	Polk	91	93
12	109 Florida	St Johns	91	92
12	111 Florida	St Lucie	82	84
12	115 Florida	Sarasota	99	100
12	117 Florida	Seminole	92	93
12	127 Florida	Volusia	91	92
13	51 Georgia	Chatham	88	80
13	89 Georgia	De Kalb	147	119
13	97 Georgia	Douglas	140	116
13	111 Georgia	Fannin	97	84
13	121 Georgia	Fulton	143	118
13	127 Georgia	Glynn	86	83
13	135 Georgia	Gwinnett	123	100
13	215 Georgia	Muscogee	108	98
13	223 Georgia	Paulding	114	95
13	245 Georgia	Richmond	109	95
13	247 Georgia	Rockdale	141	116
13	255 Georgia	Spalding	125	104
17	1 Illinois	Adams	89	79
17	19 Illinois	Champaign	105	86
17	31 Illinois	Cook	119	113
17	43 Illinois	Du Page	104	94
17	49 Illinois	Effingham	97	79
17	83 Illinois	Jersey	112	97
17	85 Illinois	Jo Daviess	99	96
17	89 Illinois	Kane	117	103
17	97 Illinois	Lake	116	106
17	111 Illinois	McHenry	108	99
17	115 Illinois	Macon	100	83
17	117 Illinois	Macoupin	103	86
17	119 Illinois	Madison	127	106
17	143 Illinois	Peoria	96	84
17	157 Illinois	Randolph	102	90
17	161 Illinois	Rock Island	85	80
17	163 Illinois	St Clair	108	97
17	167 Illinois	Sangamon	101	86
17	197 Illinois	Will	112	98
17	201 Illinois	Winnebago	101	86
18	3 Indiana	Allen	112	102
18	19 Indiana	Clark	132	111

18	33 Indiana	De Kalb	82	74
18	39 Indiana	Elkhart	115	103
18	43 Indiana	Floyd	119	110
18	57 Indiana	Hamilton	116	103
18	59 Indiana	Hancock	122	108
18	83 Indiana	Knox	103	84
18	85 Indiana	Kosciusko	100	87
18	89 Indiana	Lake	117	107
18	91 Indiana	La Porte	146	133
18	95 Indiana	Madison	121	108
18	97 Indiana	Marion	115	99
18	127 Indiana	Porter	124	112
18	129 Indiana	Posey	66	55
18	141 Indiana	St Joseph	112	99
18	157 Indiana	Tippecanoe	104	86
18	163 Indiana	Vanderburgh	114	99
18	167 Indiana	Vigo	107	90
18	169 Indiana	Wabash	108	95
18	173 Indiana	Warrick	131	109
19	113 Iowa	Linn	74	71
19	153 Iowa	Polk	84	81
19	163 Iowa	Scott	95	91
19	177 Iowa	Van Buren	82	77
20	121 Kansas	Miami	100	99
20	145 Kansas	Pawnee	80	80
20	173 Kansas	Sedgwick	90	88
20	209 Kansas	Wyandotte	107	106
21	13 Kentucky	Bell	92	75
21	15 Kentucky	Boone	113	94
21	19 Kentucky	Boyd	122	97
21	29 Kentucky	Bullitt	115	94
21	37 Kentucky	Campbell	115	99
21	47 Kentucky	Christian	103	83
21	59 Kentucky	Daviess	108	91
21	61 Kentucky	Edmonson	110	90
21	67 Kentucky	Fayette	108	97
21	83 Kentucky	Graves	94	77
21	89 Kentucky	Greenup	121	96
21	91 Kentucky	Hancock	114	82
21	93 Kentucky	Hardin	115	90
21	101 Kentucky	Henderson	108	85
21	111 Kentucky	Jefferson	121	101
21	113 Kentucky	Jessamine	99	83
21	117 Kentucky	Kenton	118	102
21	127 Kentucky	Lawrence	115	88
21	139 Kentucky	Livingston	108	91

21	145 Kentucky	McCracken	103	83
21	149 Kentucky	McLean	110	90
21	175 Kentucky	Morgan	126	104
21	185 Kentucky	Oldham	109	94
21	193 Kentucky	Perry	92	78
21	195 Kentucky	Pike	101	85
21	199 Kentucky	Pulaski	99	80
21	209 Kentucky	Scott	107	94
21	213 Kentucky	Simpson	100	86
21	221 Kentucky	Trigg	104	87
21	229 Kentucky	Washington	108	87
22	5 Louisiana	Ascension	121	115
22	11 Louisiana	Beauregard	108	103
22	15 Louisiana	Bossier	96	91
22	17 Louisiana	Caddo	100	95
22	19 Louisiana	Calcasieu	113	107
22	33 Louisiana	East Baton Ro	134	126
22	43 Louisiana	Grant	91	86
22	47 Louisiana	Iberville	132	128
22	51 Louisiana	Jefferson	110	107
22	55 Louisiana	Lafayette	107	102
22	57 Louisiana	Lafourche	127	124
22	63 Louisiana	Livingston	116	109
22	71 Louisiana	Orleans	99	95
22	73 Louisiana	Ouachita	98	97
22	77 Louisiana	Pointe Coupee	107	101
22	87 Louisiana	St Bernard	112	109
22	89 Louisiana	St Charles	115	111
22	93 Louisiana	St James	119	113
22	95 Louisiana	St John The B	114	109
22	101 Louisiana	St Mary	103	100
22	121 Louisiana	West Baton Ro	112	105
23	3 Maine	Aroostook	76	76
23	5 Maine	Cumberland	116	106
23	9 Maine	Hancock	121	107
23	11 Maine	Kennebec	98	89
23	13 Maine	Knox	111	98
23	17 Maine	Oxford	97	81
23	19 Maine	Penobscot	95	84
23	21 Maine	Piscataquis	80	69
23	23 Maine	Sagadahoc	124	112
23	25 Maine	Somerset	92	83
23	29 Maine	Washington	104	104
23	31 Maine	York	126	112
24	3 Maryland	Anne Arundel	151	133
24	5 Maryland	Baltimore	130	111

24	9 Maryland	Calvert	97	82
24	13 Maryland	Carroll	115	93
24	15 Maryland	Cecil	139	115
24	17 Maryland	Charles	109	90
24	19 Maryland	Dorchester	117	99
24	25 Maryland	Harford	140	121
24	29 Maryland	Kent	111	95
24	31 Maryland	Montgomery	119	100
24	33 Maryland	Prince George	134	119
24	510 Maryland	Baltimore City	137	125
25	1 Massachusetts	Barnstable	128	114
25	3 Massachusetts	Berkshire	89	77
25	5 Massachusetts	Bristol	122	105
25	9 Massachusetts	Essex	119	109
25	13 Massachusetts	Hampden	126	114
25	15 Massachusetts	Hampshire	129	115
25	17 Massachusetts	Middlesex	113	100
25	23 Massachusetts	Plymouth	104	91
25	25 Massachusetts	Suffolk	106	93
25	27 Massachusetts	Worcester	122	105
26	5 Michigan	Allegan	137	120
26	19 Michigan	Benzie	108	97
26	21 Michigan	Berrien	116	101
26	27 Michigan	Cass	115	102
26	37 Michigan	Clinton	89	78
26	49 Michigan	Genesee	98	89
26	63 Michigan	Huron	115	103
26	65 Michigan	Ingham	97	87
26	77 Michigan	Kalamazoo	102	90
26	81 Michigan	Kent	127	114
26	91 Michigan	Lenawee	104	95
26	99 Michigan	Macomb	129	119
26	101 Michigan	Manistee	97	87
26	105 Michigan	Mason	125	114
26	107 Michigan	Mecosta	124	110
26	121 Michigan	Muskegon	142	127
26	125 Michigan	Oakland	120	110
26	139 Michigan	Ottawa	116	104
26	143 Michigan	Roscommon	99	89
26	147 Michigan	St Clair	129	120
26	157 Michigan	Tuscola	103	93
26	161 Michigan	Washtenaw	104	95
26	163 Michigan	Wayne	121	114
27	3 Minnesota	Anoka	101	99
27	37 Minnesota	Dakota	91	89
27	75 Minnesota	Lake	78	78

27	137 Minnesota	St Louis	76	76
27	163 Minnesota	Washington	98	96
28	1 Mississippi	Adams	94	95
28	19 Mississippi	Choctaw	64	58
28	33 Mississippi	De Soto	120	118
28	37 Mississippi	Franklin	93	93
28	45 Mississippi	Hancock	113	109
28	49 Mississippi	Hinds	90	86
28	59 Mississippi	Jackson	101	100
28	75 Mississippi	Lauderdale	91	85
28	81 Mississippi	Lee	94	86
28	89 Mississippi	Madison	89	82
28	125 Mississippi	Sharkey	96	93
28	149 Mississippi	Warren	96	91
28	161 Mississippi	Yalobusha	93	86
29	47 Missouri	Clay	124	120
29	77 Missouri	Greene	101	94
29	95 Missouri	Jackson	92	89
29	99 Missouri	Jefferson	126	114
29	137 Missouri	Monroe	97	92
29	165 Missouri	Platte	110	107
29	183 Missouri	St Charles	136	124
29	186 Missouri	Ste Genevieve	122	110
29	189 Missouri	St Louis	129	113
29	510 Missouri	St Louis City	108	98
31	55 Nebraska	Douglas	85	84
31	109 Nebraska	Lancaster	75	74
33	1 New Hampshire	Belknap	88	79
33	3 New Hampshire	Carroll	79	71
33	5 New Hampshire	Cheshire	91	79
33	9 New Hampshire	Grafton	81	73
33	11 New Hampshire	Hillsborough	106	92
33	13 New Hampshire	Merrimack	95	84
33	15 New Hampshire	Rockingham	130	116
33	17 New Hampshire	Strafford	98	88
33	19 New Hampshire	Sullivan	89	80
34	1 New Jersey	Atlantic	110	93
34	3 New Jersey	Bergen	121	107
34	7 New Jersey	Camden	127	109
34	11 New Jersey	Cumberland	105	86
34	13 New Jersey	Essex	115	98
34	15 New Jersey	Gloucester	125	108
34	17 New Jersey	Hudson	120	111
34	19 New Jersey	Hunterdon	113	96
34	21 New Jersey	Mercer	134	113
34	23 New Jersey	Middlesex	139	121

34	25 New Jersey	Monmouth	130	108
34	27 New Jersey	Morris	125	106
34	29 New Jersey	Ocean	138	117
34	39 New Jersey	Union	109	94
36	1 New York	Albany	109	98
36	5 New York	Bronx	122	119
36	13 New York	Chautauqua	103	90
36	15 New York	Chemung	88	77
36	27 New York	Dutchess	115	98
36	29 New York	Erie	91	80
36	31 New York	Essex	99	87
36	41 New York	Hamilton	90	80
36	43 New York	Herkimer	86	75
36	45 New York	Jefferson	104	89
36	47 New York	Kings	131	116
36	53 New York	Madison	88	78
36	55 New York	Monroe	102	91
36	63 New York	Niagara	102	91
36	65 New York	Oneida	90	80
36	67 New York	Onondaga	103	90
36	71 New York	Orange	115	98
36	79 New York	Putnam	125	107
36	81 New York	Queens	123	118
36	85 New York	Richmond	123	109
36	91 New York	Saratoga	96	86
36	93 New York	Schenectady	92	82
36	103 New York	Suffolk	131	115
36	109 New York	Tompkins	102	91
36	111 New York	Ulster	105	90
36	117 New York	Wayne	102	89
36	119 New York	Westchester	124	107
37	3 North Carolina	Alexander	94	78
37	11 North Carolina	Avery	95	79
37	21 North Carolina	Buncombe	85	71
37	27 North Carolina	Caldwell	95	78
37	29 North Carolina	Camden	95	81
37	31 North Carolina	Carteret	90	77
37	33 North Carolina	Caswell	109	88
37	37 North Carolina	Chatham	102	78
37	51 North Carolina	Cumberland	106	88
37	61 North Carolina	Duplin	84	72
37	63 North Carolina	Durham	103	83
37	65 North Carolina	Edgecombe	91	74
37	67 North Carolina	Forsyth	118	101
37	69 North Carolina	Franklin	105	80
37	77 North Carolina	Granville	115	92

37	81 North Carolina	Guilford	111	91
37	87 North Carolina	Haywood	101	84
37	101 North Carolina	Johnston	104	82
37	109 North Carolina	Lincoln	108	89
37	113 North Carolina	Macon	88	74
37	117 North Carolina	Martin	89	73
37	119 North Carolina	Mecklenburg	120	106
37	123 North Carolina	Montgomery	106	86
37	129 North Carolina	New Hanover	103	88
37	131 North Carolina	Northampton	101	79
37	145 North Carolina	Person	94	73
37	147 North Carolina	Pitt	97	80
37	157 North Carolina	Rockingham	111	92
37	159 North Carolina	Rowan	124	100
37	173 North Carolina	Swain	76	63
37	183 North Carolina	Wake	107	88
37	199 North Carolina	Yancey	103	84
38	17 North Dakota	Cass	75	75
39	3 Ohio	Allen	106	92
39	7 Ohio	Ashtabula	105	89
39	17 Ohio	Butler	124	106
39	23 Ohio	Clark	125	107
39	25 Ohio	Clermont	116	101
39	27 Ohio	Clinton	118	99
39	33 Ohio	Crawford	102	88
39	35 Ohio	Cuyahoga	110	96
39	49 Ohio	Franklin	107	89
39	61 Ohio	Hamilton	114	106
39	81 Ohio	Jefferson	114	97
39	83 Ohio	Knox	113	98
39	85 Ohio	Lake	118	103
39	87 Ohio	Lawrence	117	90
39	89 Ohio	Licking	108	93
39	91 Ohio	Logan	111	95
39	93 Ohio	Lorain	101	92
39	95 Ohio	Lucas	114	105
39	97 Ohio	Madison	113	95
39	99 Ohio	Mahoning	108	96
39	103 Ohio	Medina	114	102
39	109 Ohio	Miami	110	94
39	113 Ohio	Montgomery	115	97
39	121 Ohio	Noble	119	98
39	129 Ohio	Pickaway	110	90
39	133 Ohio	Portage	114	101
39	135 Ohio	Preble	103	85
39	151 Ohio	Stark	107	91

39	153 Ohio	Summit	113	101
39	155 Ohio	Trumbull	108	94
39	165 Ohio	Warren	128	109
39	167 Ohio	Washington	112	88
40	27 Oklahoma	Cleveland	101	100
40	31 Oklahoma	Comanche	92	89
40	87 Oklahoma	Mc Clain	93	91
40	109 Oklahoma	Oklahoma	110	111
40	143 Oklahoma	Tulsa	121	122
42	1 Pennsylvania	Adams	112	92
42	3 Pennsylvania	Allegheny	133	118
42	7 Pennsylvania	Beaver	107	99
42	11 Pennsylvania	Berks	114	96
42	13 Pennsylvania	Blair	110	87
42	17 Pennsylvania	Bucks	137	117
42	21 Pennsylvania	Cambria	100	81
42	27 Pennsylvania	Centre	106	88
42	43 Pennsylvania	Dauphin	113	95
42	45 Pennsylvania	Delaware	124	106
42	47 Pennsylvania	Elk	95	78
42	49 Pennsylvania	Erie	107	92
42	55 Pennsylvania	Franklin	113	91
42	69 Pennsylvania	Lackawanna	110	96
42	71 Pennsylvania	Lancaster	116	99
42	73 Pennsylvania	Lawrence	101	91
42	77 Pennsylvania	Lehigh	111	97
42	79 Pennsylvania	Luzerne	105	86
42	81 Pennsylvania	Lycoming	87	74
42	85 Pennsylvania	Mercer	111	99
42	91 Pennsylvania	Montgomery	118	98
42	95 Pennsylvania	Northampton	116	97
42	99 Pennsylvania	Perry	103	85
42	101 Pennsylvania	Philadelphia	130	116
42	111 Pennsylvania	Somerset	109	82
42	125 Pennsylvania	Washington	112	88
42	129 Pennsylvania	Westmoreland	119	98
42	133 Pennsylvania	York	105	87
44	3 Rhode Island	Kent	133	114
44	7 Rhode Island	Providence	120	102
45	1 South Carolina	Abbeville	93	82
45	3 South Carolina	Aiken	104	83
45	7 South Carolina	Anderson	114	101
45	11 South Carolina	Barnwell	95	80
45	15 South Carolina	Berkeley	98	84
45	19 South Carolina	Charleston	93	87
45	21 South Carolina	Cherokee	103	89

45	23 South Carolina	Chester	105	90
45	31 South Carolina	Darlington	100	85
45	37 South Carolina	Edgefield	92	77
45	73 South Carolina	Oconee	92	82
45	77 South Carolina	Pickens	107	96
45	79 South Carolina	Richland	104	93
45	83 South Carolina	Spartanburg	110	99
45	87 South Carolina	Union	93	81
45	89 South Carolina	Williamsburg	88	75
45	91 South Carolina	York	114	95
47	1 Tennessee	Anderson	112	95
47	9 Tennessee	Blount	124	110
47	25 Tennessee	Claiborne	105	82
47	31 Tennessee	Coffee	105	87
47	37 Tennessee	Davidson	115	106
47	41 Tennessee	De Kalb	97	81
47	43 Tennessee	Dickson	120	103
47	45 Tennessee	Dyer	112	100
47	55 Tennessee	Giles	104	93
47	65 Tennessee	Hamilton	118	108
47	75 Tennessee	Haywood	103	89
47	85 Tennessee	Humphreys	102	86
47	89 Tennessee	Jefferson	123	102
47	93 Tennessee	Knox	115	105
47	105 Tennessee	Loudon	112	91
47	141 Tennessee	Putnam	96	81
47	149 Tennessee	Rutherford	93	79
47	155 Tennessee	Sevier	111	95
47	157 Tennessee	Shelby	128	122
47	163 Tennessee	Sullivan	110	96
47	165 Tennessee	Sumner	124	110
47	187 Tennessee	Williamson	106	94
47	189 Tennessee	Wilson	108	98
48	29 Texas	Bexar	120	117
48	39 Texas	Brazoria	144	140
48	61 Texas	Cameron	84	84
48	85 Texas	Collin	126	119
48	113 Texas	Dallas	134	127
48	121 Texas	Denton	139	130
48	139 Texas	Ellis	116	112
48	167 Texas	Galveston	182	174
48	183 Texas	Gregg	130	123
48	201 Texas	Harris	188	173
48	215 Texas	Hidalgo	64	64
48	245 Texas	Jefferson	139	133
48	355 Texas	Nueces	115	112

48	361 Texas	Orange	120	114
48	423 Texas	Smith	111	106
48	439 Texas	Tarrant	139	131
48	453 Texas	Travis	105	99
48	469 Texas	Victoria	98	95
48	479 Texas	Webb	73	73
50	3 Vermont	Bennington	103	92
50	7 Vermont	Chittenden	85	76
51	13 Virginia	Arlington	126	108
51	33 Virginia	Caroline	98	83
51	36 Virginia	Charles City	104	85
51	41 Virginia	Chesterfield	107	87
51	59 Virginia	Fairfax	120	106
51	61 Virginia	Fauquier	99	77
51	69 Virginia	Frederick	103	82
51	85 Virginia	Hanover	116	99
51	87 Virginia	Henrico	108	94
51	89 Virginia	Henry	104	84
51	113 Virginia	Madison	97	79
51	121 Virginia	Montgomery	96	78
51	147 Virginia	Prince Edward	101	78
51	153 Virginia	Prince William	109	92
51	161 Virginia	Roanoke	98	86
51	173 Virginia	Smyth	98	77
51	179 Virginia	Stafford	109	92
51	197 Virginia	Wythe	95	76
51	510 Virginia	Alexandria Cit	120	103
51	650 Virginia	Hampton City	100	88
51	800 Virginia	Suffolk City	104	86
54	11 West Virginia	Cabell	120	97
54	21 West Virginia	Gilmer	107	75
54	25 West Virginia	Greenbrier	100	74
54	29 West Virginia	Hancock	103	93
54	39 West Virginia	Kanawha	110	85
54	69 West Virginia	Ohio	104	83
54	93 West Virginia	Tucker	97	68
54	107 West Virginia	Wood	118	91
55	9 Wisconsin	Brown	107	99
55	21 Wisconsin	Columbia	104	97
55	25 Wisconsin	Dane	96	91
55	27 Wisconsin	Dodge	90	84
55	29 Wisconsin	Door	125	111
55	37 Wisconsin	Florence	80	75
55	39 Wisconsin	Fond Du Lac	95	88
55	55 Wisconsin	Jefferson	98	92
55	59 Wisconsin	Kenosha	129	116

55	61 Wisconsin	Kewaunee	120	108
55	71 Wisconsin	Manitowoc	126	114
55	73 Wisconsin	Marathon	84	78
55	79 Wisconsin	Milwaukee	128	120
55	85 Wisconsin	Oneida	76	71
55	87 Wisconsin	Outagamie	98	92
55	89 Wisconsin	Ozaukee	126	117
55	95 Wisconsin	Polk	85	83
55	101 Wisconsin	Racine	119	107
55	105 Wisconsin	Rock	105	99
55	109 Wisconsin	St Croix	87	85
55	111 Wisconsin	Sauk	93	89
55	117 Wisconsin	Sheboygan	122	110
55	119 Wisconsin	Taylor	81	77
55	123 Wisconsin	Vernon	83	80
55	127 Wisconsin	Walworth	100	94
55	131 Wisconsin	Washington	102	93
55	133 Wisconsin	Waukesha	102	93
55	139 Wisconsin	Winnebago	96	90